Naval Sea Systems Command
Naval Surface Warfare Center

Littoral Warfare Systems Product Area Directorate (LWS PAD)

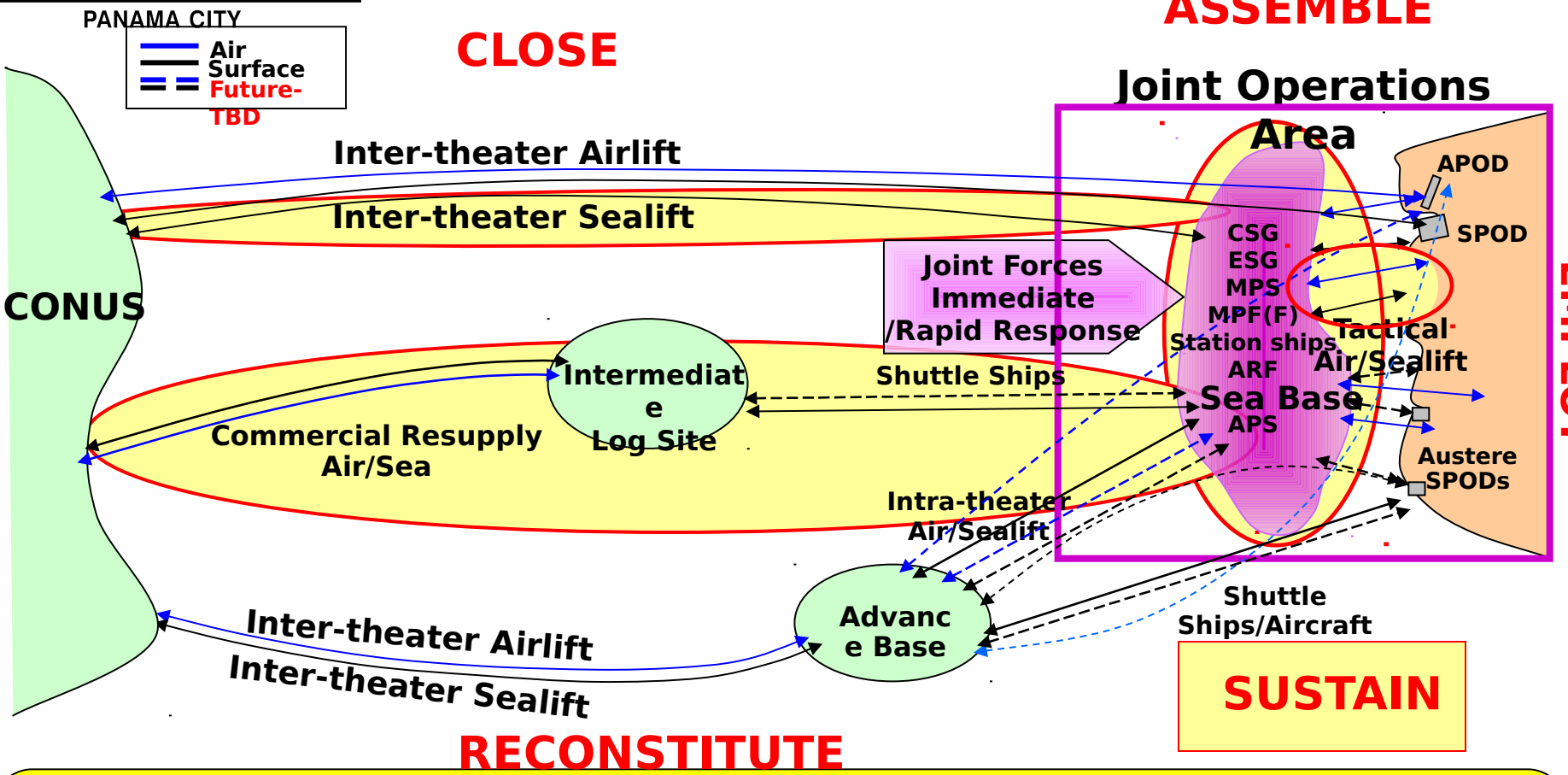
Seabasing S&T And R&D Roadmap For A Joint Capability

Presented By
Patrick J. Spring

Seabasing Overview

NAVSEA WARFARE CENTERS

PANAMA CITY



The *sea base* is an inherently maneuverable, scalable aggregation of distributed, networked platforms that enable the global power projection of offensive and defensive forces from the sea, and includes the ability to assemble, equip, project, support, and sustain those forces without reliance on land bases within the Joint Operations Area.

Not to Scale

The Global Environment

Reduced reliance on overseas basing

Continuous forward presence and rapid surge

Increased maneuver space – enhanced avenues of approach

Leveraging our asymmetric capabilities

Netted – Joint Sea Based Expeditionary Forces – the way

The National Environment

Transforming the Military

Integrated, Joint, Netted Warfighting

Homeland Security Concerns

Increased CONUS Based Training

Seabasing – Persistence, Speed, Access

NAVSEA
WARFARE CENTERS
PANAMA CITY

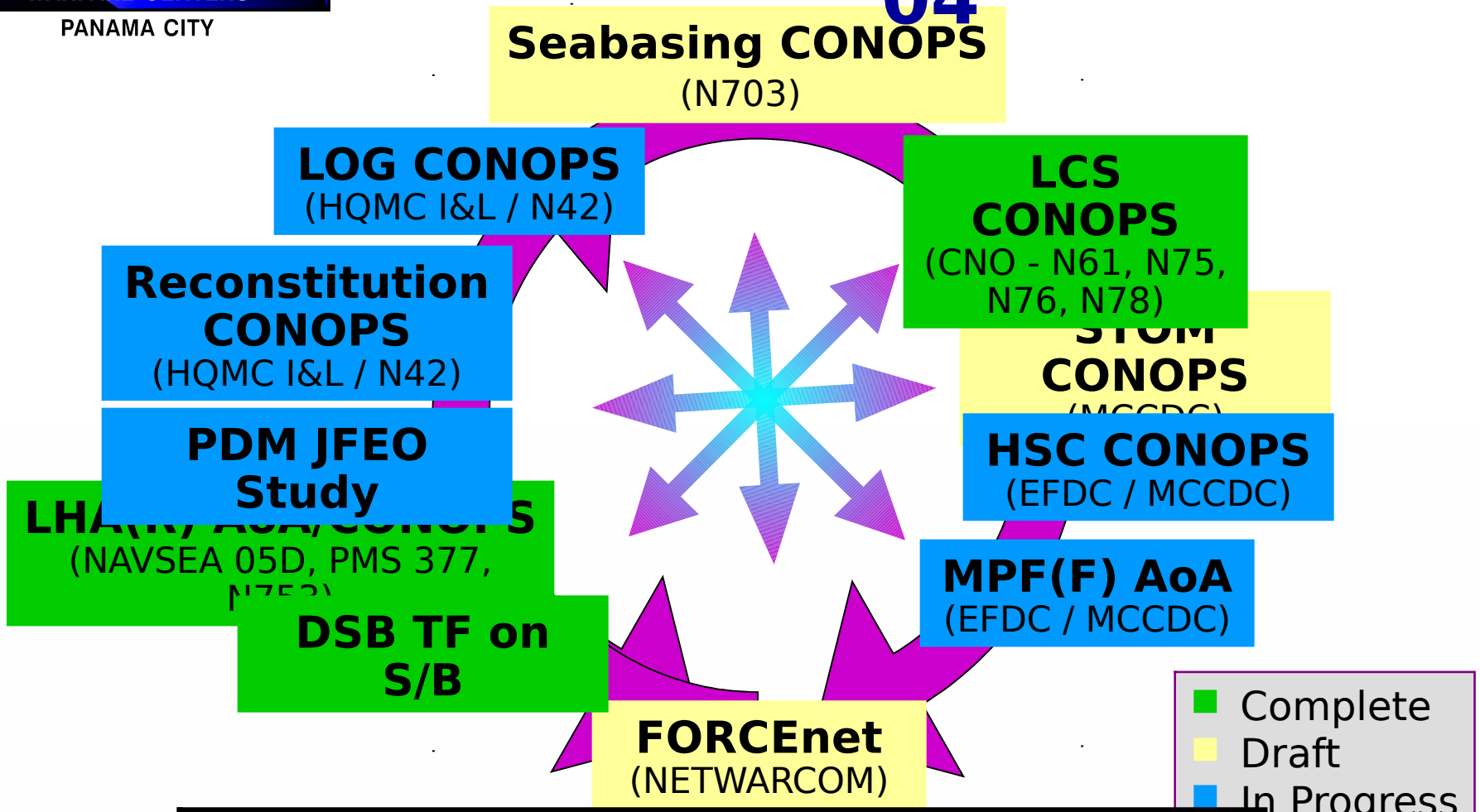
Sea Base Pillar N703 Tasking

Littoral Warfare Product Area Director (PAD)

- Tasking Letter (25 Nov 03)
  - Identify, Evaluate and Assess Systems and Technology
    - Science and Technology
    - Research and Development
    - Underway and Proposed
    - DoD and Industry
  - Develop Sea Base Roadmap to Fully Field Capabilities (Joint Service)
- Specific Focus on Existing Commercial and DoD (S&T and R&D) Capability Which Solves Known Technology Gaps
  - Connectors
  - Logistics Planning/Systems
  - Interfaces (Inter-Ship/Intra-Ship)
  - Command and Control (C2)
  - Develop POA&M)
  - Determine Resourcing Requirements
  - Identify Navy/Marine Corps and Joint Service Activities Requiring Access

NAVSEA
WARFARE CENTERS
PANAMA CITY

Source Documents June 04

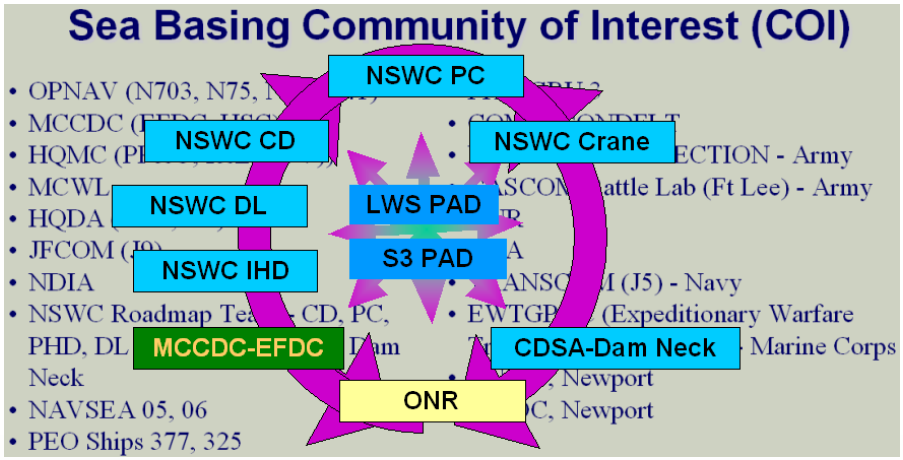


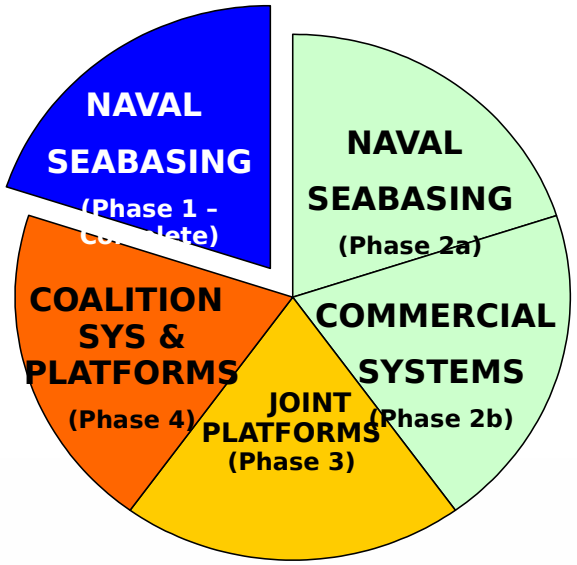
Recommendations:

1. **Seabasing CONOPS needs to be the overarching concept.**
2. **Conflicts between CONOPS must be resolved.**

NAVSEA
WARFARE CENTERS
PANAMA CITY

Seabasing Roadmap



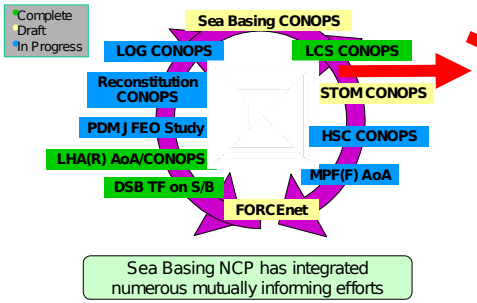

NAVAL SEABASING (Phase 1 - Complete)
NAVAL SEABASING (Phase 2a)
COMMERCIAL SYSTEMS (Phase 2b)
JOINT PLATFORMS (Phase 3)
COALITION SYS & PLATFORMS (Phase 4)

- ID, Evaluation and Assessment of Systems/Technology
- Develop Sea Base Roadmap to Fully Field Capabilities (Joint Services)
- Specific Focus on Existing Commercial and DoD S&T and R&D that supports seabasing requirements

NAVSEA WARFARE CENTERS
PANAMA CITY

Roadmap Framework

SOURCE



Sea Basing NCP has integrated numerous mutually informing efforts

Transformation Roadmap

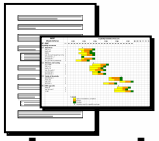
DOORS

Common Unique Reqs -Missing -Conflicts

Filter

Legacy sys

Prog of Record



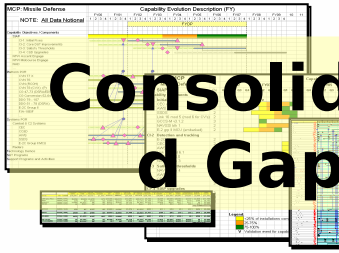
Investment Priorities

Academia

S & T

R & D

COMMERCIAL



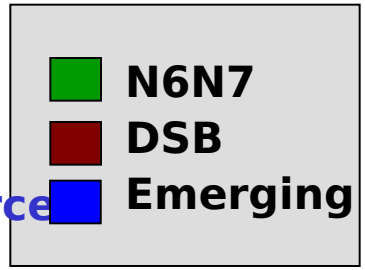
Consolidated Gaps

NAVSEA
WARFARE CENTERS
PANAMA CITY

Seabasing Gaps

Roadmap development began with NCP gaps and expanded as more were identified.

1. Interface Between Large and Small Vessels
2. Interface Between Large Vessels
3. Heavy Lift Surface Connectors
4. Sea Base Capable, Heavy Lift Vertical Connector
5. Automated and Integrated Warehousing
6. Distributed, Collaborative Operational Logistics Planning
7. Total Asset Visibility
8. Advanced Simulators for Rehearsal
9. Cargo Transfer at Sea
10. Ships of Appropriate Design
11. Joint Logistics Support System
12. Sea State 4 Intra-Theater Lift
13. Shared Communications Architecture
14. Decontamination for Reconstitution of Force
15. On-Station Reload of NSFS Assets
16. Sea Based Maintenance
17. Bulk Liquid Handling and Transfer
18. Sea Based Medical



NAVSEA
WARFARE CENTERS
PANAMA CITY

Summary of Gaps- N6N7 Gaps

	Addressed	Comments
1. Interface between Large and Small Vessels	Yes	MPF(F) R&D ILP/Well Deck. HiCASS (Large/Small)
2. Interface between Large Vessels	Yes	MPF(F) R&D (Skin-to-Skin), ONR HiCASS (Large/Large,)
3. Heavy Lift Surface Connector	No	Not enough connectors to support MPG MEB OPS without MPG organic lighters (LCH Candidate)
4. Heavy Lift Vertical Connector	No	No POR for a sea base-capable, heavy-lift aircraft
5. Automated and Integrated Warehouse	No	No POR for Sea Base Capability; MPF(F) R&D to address some elements
6. Operational Logistics Planning	No	Stove-piped ship unique systems with no plans to integrate
7. Total Asset Visibility	No	Specialized systems with no POR to fully integrate
8. Advanced Simulators for Rehearsal	No	Current systems unique to ships, craft or aircraft Integrated Sea Base simulation test bed needs to be considered

NAVSEA
WARFARE CENTERS
PANAMA CITY

Summary of Gaps - DSB Gaps

Gaps	Addressed	Comments
9. Cargo Transfer at Sea	Yes	Ship-to-Ship: MPF(F) R&D ONR Heavy Lift UNREP
10. Ships of Appropriate Design	Partially	Expeditionary Warfare Ship Mix Study
11. Joint Logistics Support System	No	Systems are tailored to specific Service needs.
12. Sea State 4 Intra-Theater Lift	No	Requirements for Surface Connector undefined
13. Shared Communications Architecture	No	DJC2-Maritime and MPF(F) ship systems design undefined. MPF(F) and DJC2 coordinated planning should be merged

NAVSEA
WARFARE CENTERS
PANAMA CITY

Summary of Gaps - Emerging Gaps

	Addressed	Comments
14. Decontamination for Reconstitution of Forces	No	Designs for modular systems available; no funding planned.
15. On-Station Reload for NSFS Assets	No	1. Design available for surface ship VLS; not funded. 2. Nothing for at-sea reload of submarines.
16. Sea Based Maintenance	TBD	To be addressed in a follow-on Roadmap phase
17. Bulk Liquid Handling and Transfer	TBD	To be addressed in a follow-on Roadmap phase
18. Sea Based Medical	TBD	To be addressed in a follow-on Roadmap phase

NAVSEA
WARFARE CENTERS
PANAMA CITY

Sea Basing Capabilities Challenges

- Surface connector interfaces
- Heavy lift surface transport
- Sea base capable heavy lift vertical transport
- Heavy load transfer in high sea states
- High sea state relative ship positioning
- Selective offload (Onload), material handling, packaging modularity
- Strike up/strike down
- Distributed, collaborative operational logistics planning, total asset visibility
- Automated and integrated warehouse
- Repackaging of load en route and after establishment of SB, modular packaging
- Virtual reality simulators for rehearsal
- ESG/CSG Command Structure/Relationship

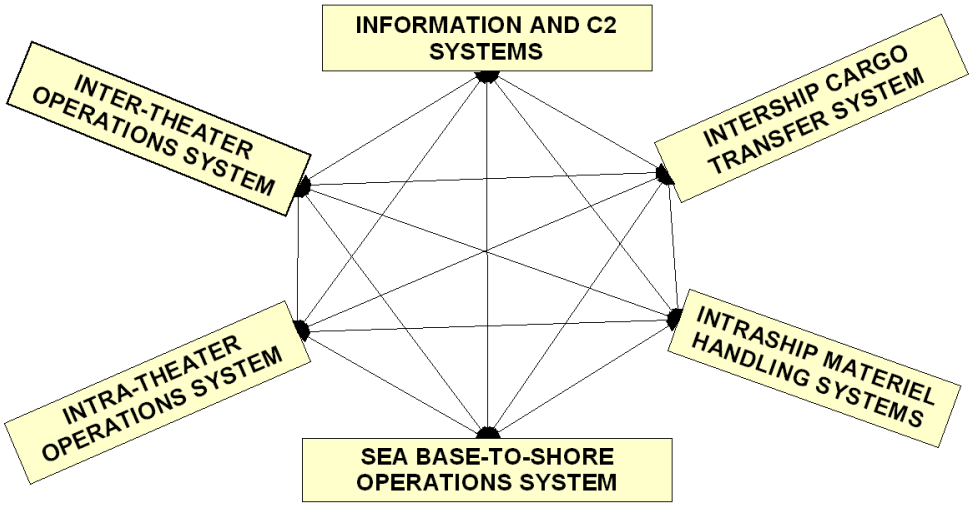
NAVSEA
WARFARE CENTERS
PANAMA CITY

Phase I Roadmap Conclusions

- Sea Base definition of requirements with overarching CONOPS
- Systems of Systems Integrator Required
- Command and Control Integrator / Technical Agent Required
- Initiate POR for R&D recommendations
- Facilitator for S&T/R&D transition to multiple platforms

NAVSEA
WARFARE CENTERS
PANAMA CITY

Seabasing Roadmap Challenges



- **Joint and Coalition**
  - **… interests must be addressed while maintaining the inherently NAVAL characteristics of a SEA base.**
- **MISSION CAPABILITIES**
  - **… going well beyond platform concepts**
- **Scalability**
- **Affordability**

NAVSEA
WARFARE CENTERS
PANAMA CITY

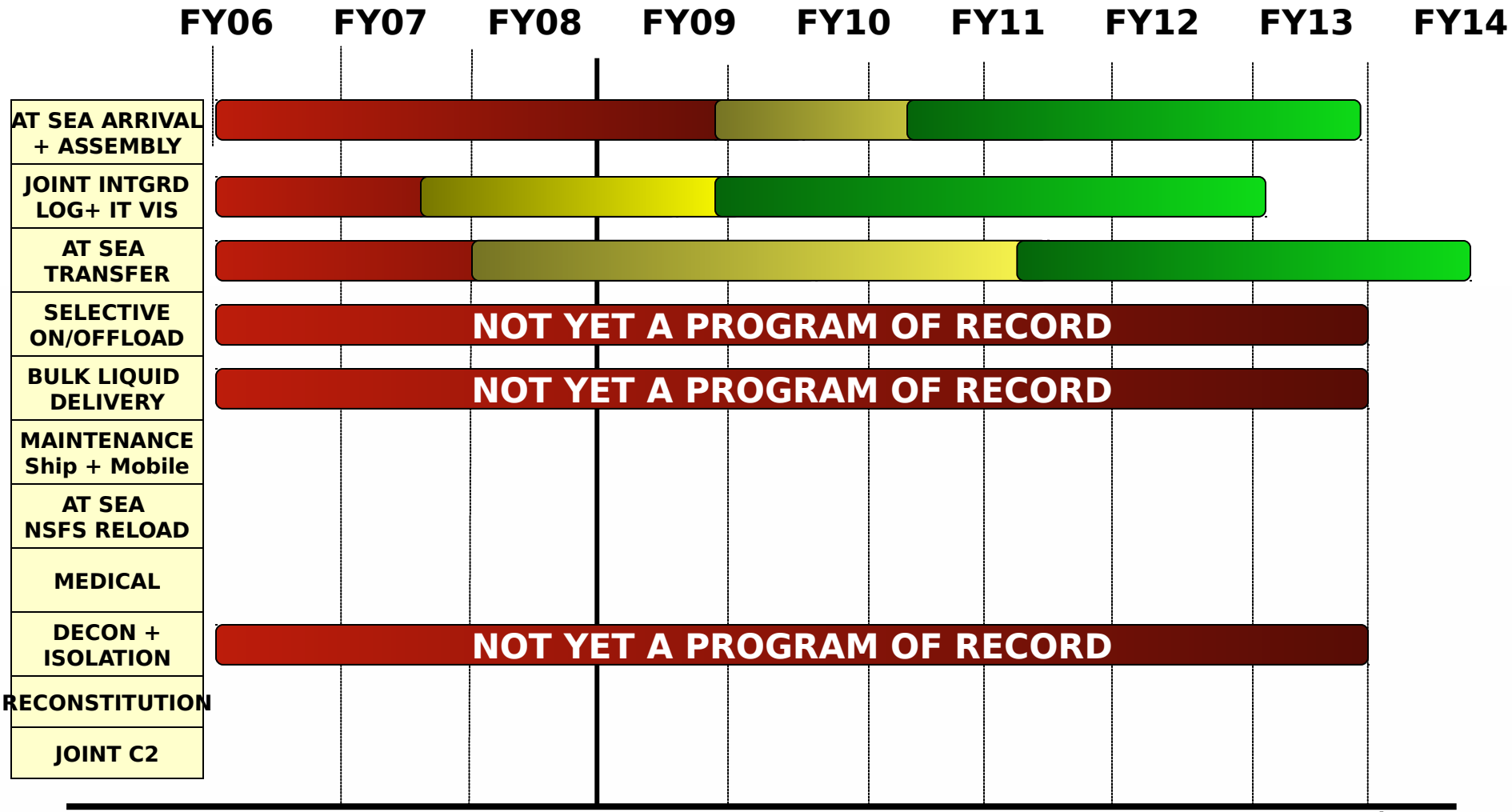
CNO Guidance for 2005

- **Provide a cost-constrained roadmap for Seabasing in the joint warfighting environment that evaluates needs and options for the following elements:**
  - **MPF(F)**
  - **LHA(R)**
  - **Logistics CONOPs**
  - **Inter-Theater Connector (High Speed Sealift)**
  - **Intra-Theater Connector (High Speed Connector)**
  - **Tactical Assault Connector (LCAC(X))**

- **Develop a fiscally-informed process that assures a coherent S&T to R&D to procurement continuum that is disciplined and has termination options for non-promising/non-capability contributing programs and activities.**
- **Establish a Navy-wide CONOPs database, coordinate and deconflict CONOPs development**

NAVSEA
WARFARE CENTERS
PANAMA CITY

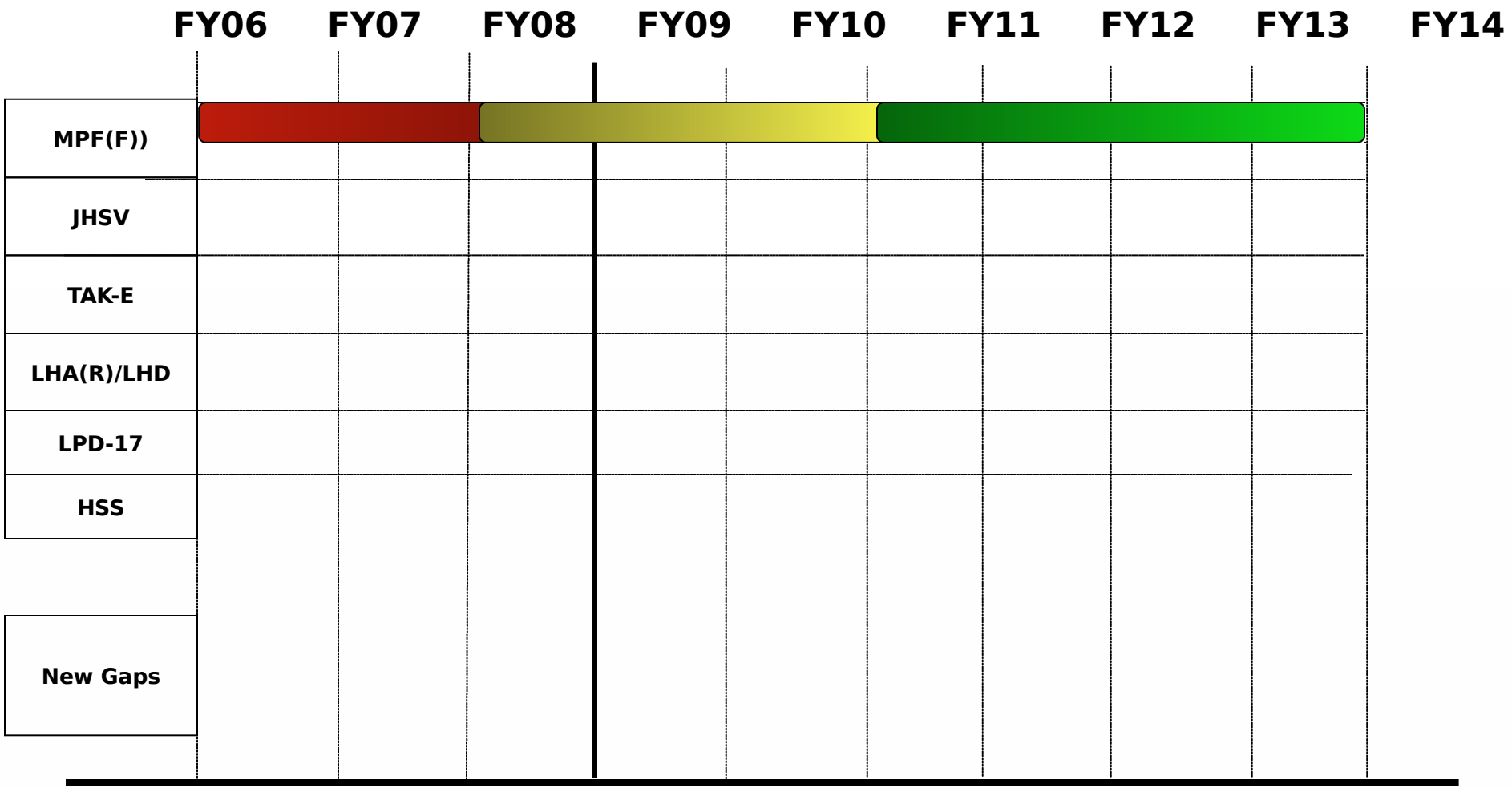
Seabasing Roadmap Capabilities Timeline



NAVSEA
WARFARE CENTERS
PANAMA CITY

Seabasing Roadmap Capabilities\Requirements Timeline

AT SEA TRANSFER

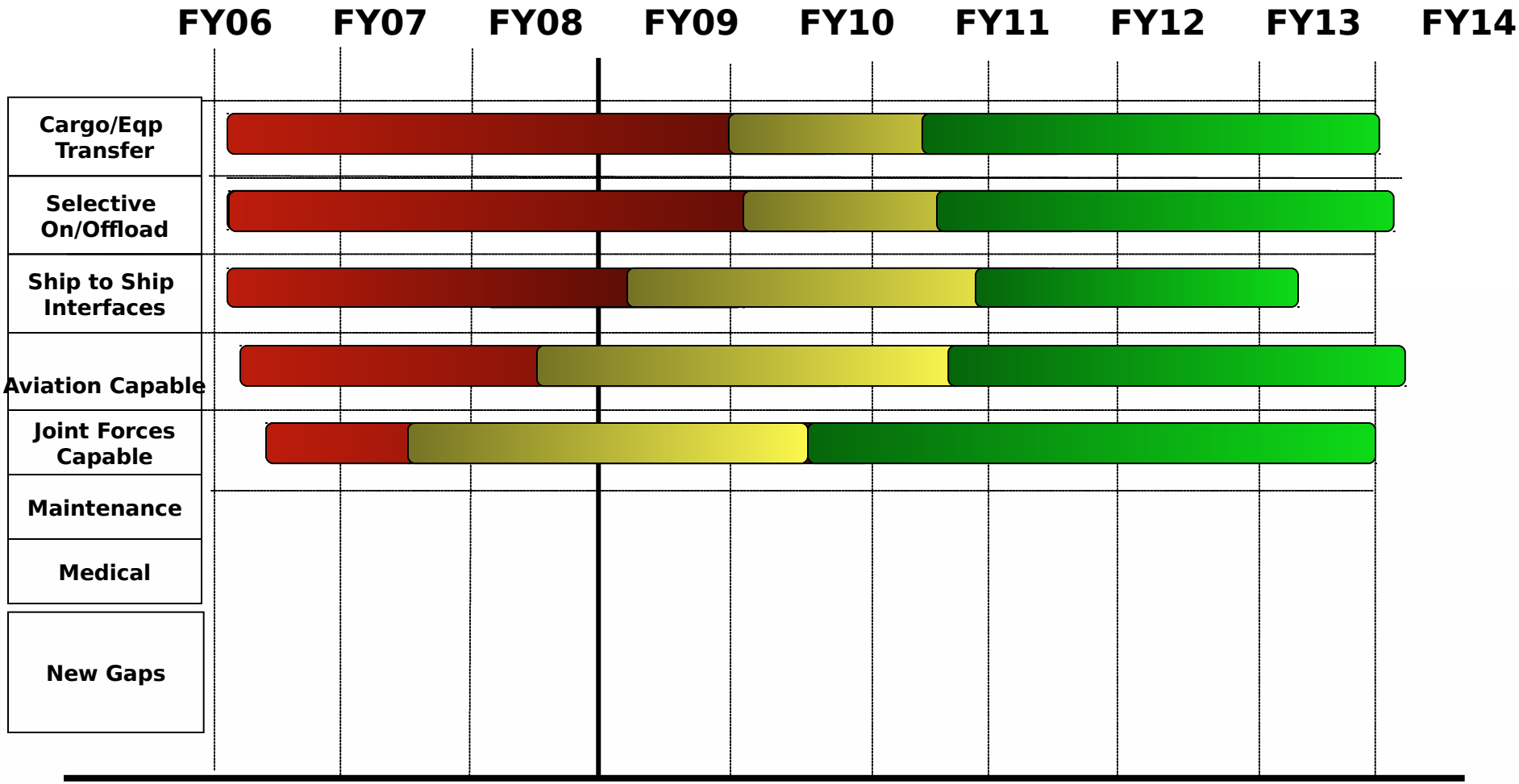


Return to Seabasing Roadmap Timeline

NAVSEA
WARFARE CENTERS
PANAMA CITY

Seabasing Roadmap Requirements Timeline

MPF(F)

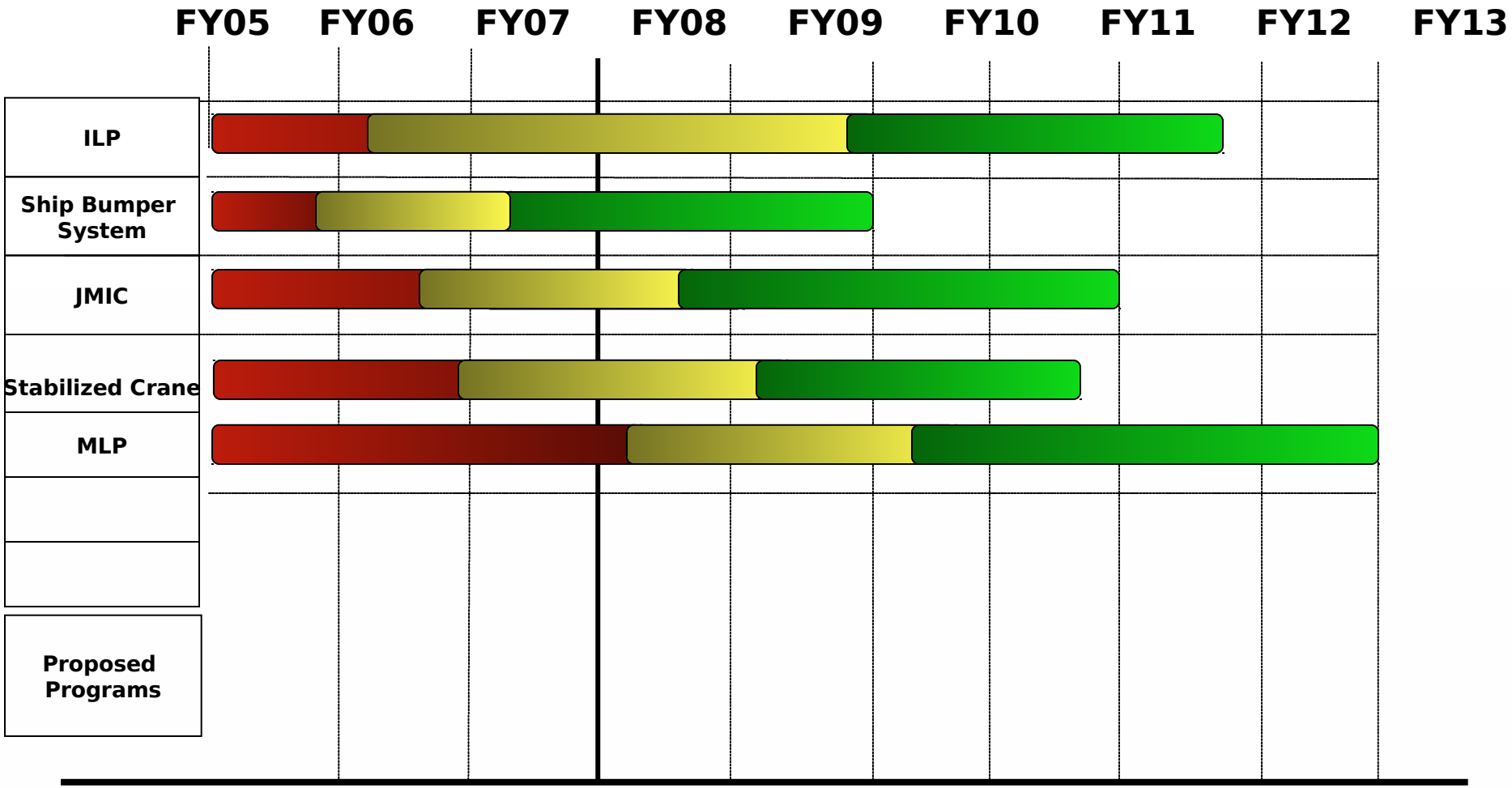


Return to Seabasing Roadmap Timeline

NAVSEA
WARFARE CENTERS
PANAMA CITY

Seabasing Roadmap Program Timeline

Cargo/Equipment Transfer



Return to Seabasing Roadmap Timeline

Integrated Landing Platform(ILP)/Mobile Landing Platform(MLP)

CONCEPT	NEED/GAP/BENEFIT
SCOPE: An interface to enable cargo, vehicles and personnel to be transferred via roll-on/roll-off (RO/RO) between the MPF(F) and surface connectors in SS3 (objective)/SS4+ (goal)	SYSTEM NEED: Stowable, external (non-well deck) platform for MPF(F) to load surface connectors alongside in SS3/SS4+ TECHNOLOGY GAPS: 1. Retractable platform and ramp for hovercraft ops 2. Heading control req'd to maintain sheltered area for surface connector alongside mooring and/or ILP entry/exit in SS3/SS4+ BENEFIT/PAYOFF/ROI: Delivery of cargo and heavy vehicles to the shore via surface connectors.

SYSTEM	ENABLING TECHNOLOGY	ASSESSED RISK	EXIT CRITERIA	TRL NOW/GOAL
Interface Landing Platform (ILP) - for LCAC and other surface connectors in place of a well deck	NSWCCD ILP Design	MEDIUM – Concept demo conducted Aug 2004 in calm seas	Build and demo a full sized prototype at sea aboard ship in SS3-4	4/9
Advanced Fenders - for alongside mooring of surface connectors	Deep Draft Composite Fenders (DDCF)	LOW		7/9
Low-speed Ship Roll Mitigation System	Controlled Passive Anti-Roll Tanks	LOW – installed on comm. ships	Capability to shelter the ILP and minimize ship roll in beam seas	9
Automated Ship Heading and Position Control, i.e. Station-keeping	Dynamic Positioning	LOW – installed on comm. ships	Capability to maintain heading to shelter the ILP from waves	9

Roadmap Objectives :Naval Focus

NAVSEA WARFARE CENTERS
PANAMA CITY

2004 **2006** 2008 2011 2013

Phase 1

- Develop Seabasing S&T and R&D Roadmap
- SB Community of Interest Meetings
- Integrate with JCIDS Process
- SB Studies Complete (NSB,NRAC, JIC)

- POR Execution {MPF(F), JHSV LCAC (X)}
- Open Joint Arena
- Experimentation at Joint and DoD level
- Operationally Networked beyond Naval
- Implement SB Technology Solution Reviews

Phase 2 (PR-07)

NAVSEA
WARFARE CENTERS
PANAMA CITY

Roadmap Objectives :Joint Focus

2004 2006 2008 2011 2013

Phase 1

- Develop Seabasing S&T and R&D Roadmap
- SB Community of Interest Meetings
- Integrate with JCIDS Process
- SB Studies Complete (NSB,NRAC, JIC)

- POR Execution {MPF(F), JHSV LCAC (X)}
- Open Joint Arena
- Experimentation at Joint and DoD level
- Operationally Networked beyond Naval
- Implement SB Technology Solution Reviews

Phase 2 (PR-07)

Phase 3 (POM-08)

- Extended National Operational Network
- DoD Sea Base and Littoral Warfare Center
  - ✓ Established LW Training Center
  - ✓ Sea-Basing Test Bed

QUESTIONS?

NAVSEA
WARFARE CENTERS
PANAMA CITY

Back up Slides

NAVSEA
WARFARE CENTERS
PANAMA CITY

1. Interface Between Large and Small Vessels

GAP: An interface to enable large delivery platforms to interface with various classes of small surface craft/vessels for loading and unloading and transfer of equipment, material, and personnel in Sea State 4.

Status	System	Comments
Legacy	Well Deck	Does not provide capability for TSV/HSC
	INLS RRDF	Sea State 2+, transportation issues, difficult deployment
R&D	MPF(F) ILP	MPF(F) must shelter ILP from waves above SS2
	Deep Draft Composite Fenders	Covers heave of displacement craft alongside of ship; applicable to ships other than MPF(F)
	Ship-attached RIB	Support system to mitigate waves in SS3
S&T	HiCASS (Small)	ONR FNC; includes cargo transfer capability
Concept	Intermediate Transfer Station	Interface for large and small vessels

Recommendations

1. **Continue current R&D/S&T along with alternatives to mitigate risk.**
2. **Ensure surface connector designs have capability to interface with the appropriate large surface vessels.**

9. Cargo Transfer at Sea

GAP: Transfer vehicles, cargo and personnel between ships in SS 3 (threshold) and 4+ (goal). A heavy-lift CONREP system to transfer quadcons or other cargo up to 12,000 lbs between two ships in a conventional connected replenishment.

Status	System/Concept	Comments
Legacy	LAREDS	Laser separation distance measurement
R&D	Advanced Crane Control	For legacy and future cranes
	MPF(F) Skin-to-skin Cargo Transfer Systems	Addresses commercial and advanced cranes, ramp, "gangway" and hose transfer options for containers, vehicles, personnel and bulk liquids.
	Ship Roll Mitigation	Commercial systems
	12,000-lb STREAM	For CLF ship CONREPs
	Wireless RAnging, Phone and Data (WRAPD) Link	Separation distance measurement plus voice and data transmission
S&T	Autolog	High Line–based 40klb system

Recommendations:

1. Support the MPF(F) R&D Plan for development of transfer systems.

16. Sea Based Maintenance

GAP: The Sea Base must provide maintenance support for ships, vessels, lighters, aircraft and combat vehicles all Services. Note: detachments to bring their own maintenance equipment.

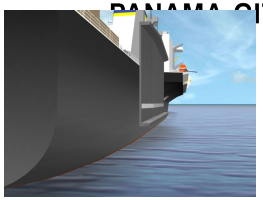
Status	System/Concept	Comments
Inactive	Modular Maintenance Repair System (MMRS)	Containerized maintenance support modules
R&D	BG-AME, OMMS-NG	Information systems
S&T	Machinery Prognosis and Diagnostics (for DDG)	ONR ACI
	Integrated Predictive Diagnostics	ONR MURI
	Rapid Prototyping and Freeform Fabrication	ONR ACI

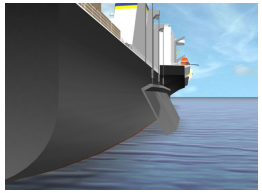
Recommendation:

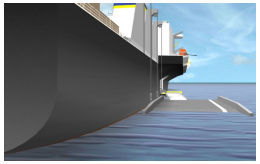
In a follow-on phase of the Roadmap, identify the Sea-Based maintenance support needs for ships, vessels, lighters, aircraft and combat vehicles all Services, especially in light of SEA SWAP.

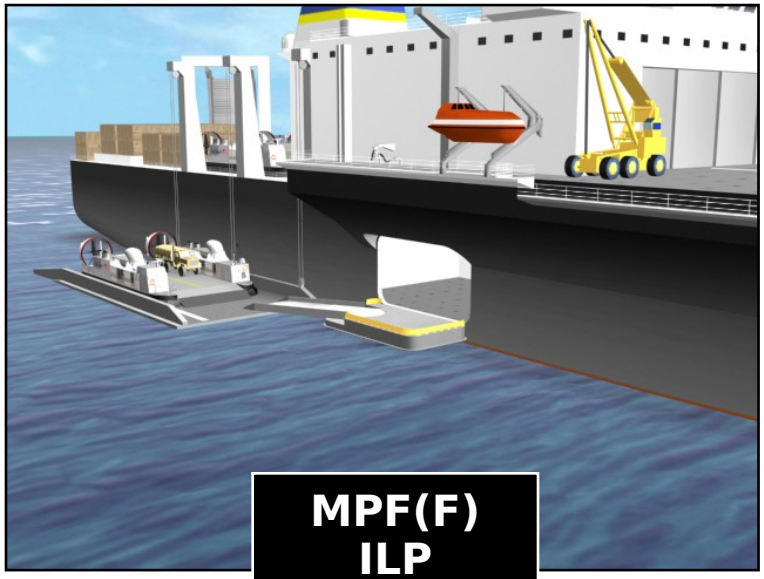
NAVSEA
WARFARE CENTERS
PANAMA CITY

Interface Landing Platform (ILP)

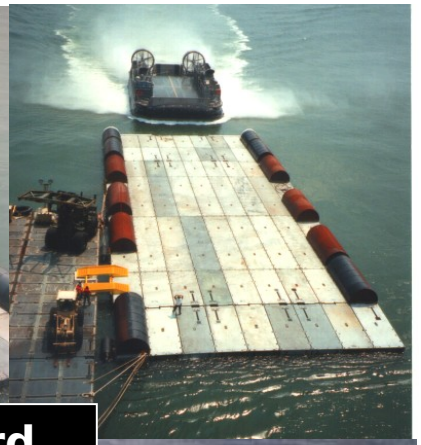




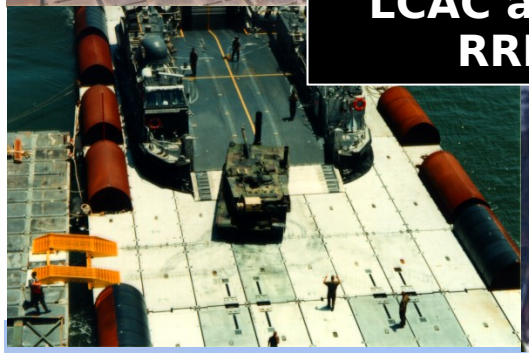




MPF(F)
ILP



LCAC aboard
RRDF

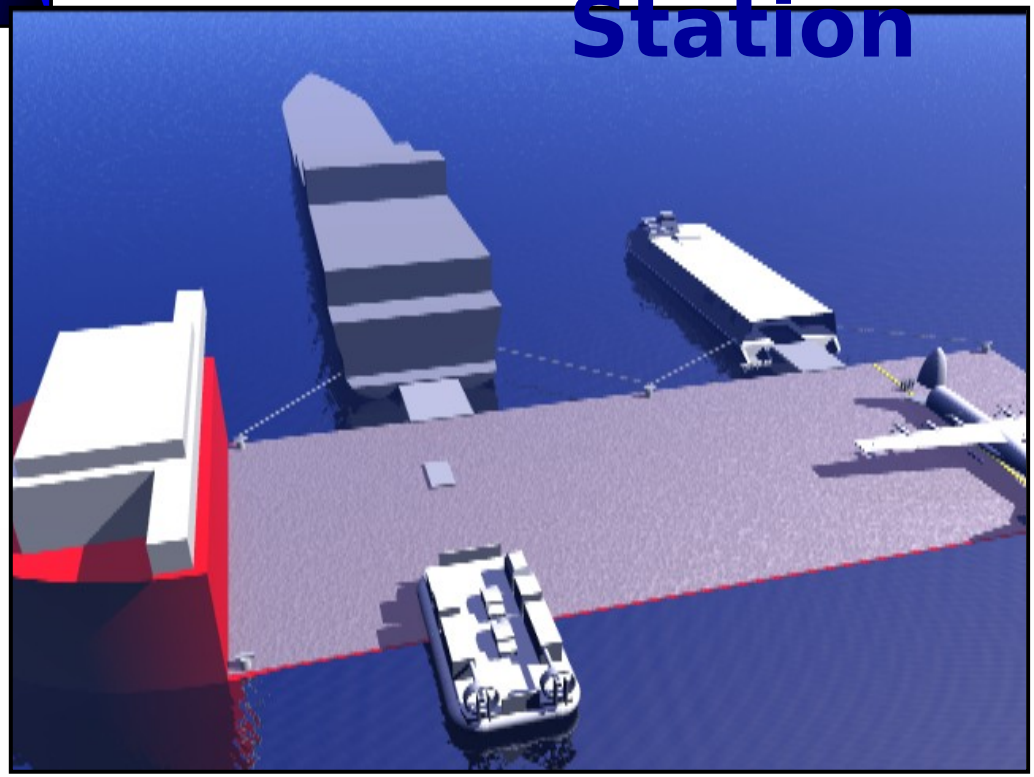


HSV-2

LSV

NAVSEA
WARFARE CENTERS
PANAMA CITY

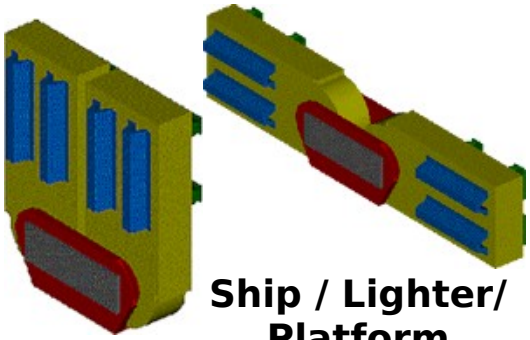
Intermediate Transfer Station



Artist concept of the **Intermediate Transfer Station** concept. Semi-submersible ship carries craft to OA and then uses DP to hold itself relative to waves and ballasts itself so lee side is at water height to allow LCAC or sea-plane access and displacement landing craft interface. RO/RO ships med-moor to other side facing into waves and discharge cargo.

Ship-to-Ship Mooring

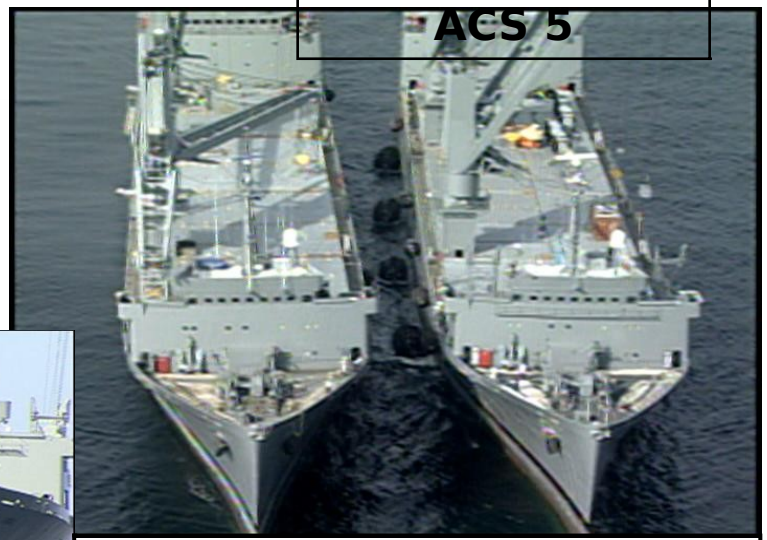
Container transfer ship to lighter during a JLOTS exercise



Ship / Lighter/ Platform Fender

HSV-1 Joint Venture moored to T-ACS 5

Vacuum Mooring



Skin-to-skin demo – 1 Oct 2003 - Included container transfer demo with PCS crane